

## Gas-Fired Counterflow Furnace

### INTRODUCTION

Before installing the furnace, refer to "Procedure for Gas Furnace Installation" (packaged with the furnace) for information concerning combustion, venting, piping, and other standard installation practices. Further reference is made to the current edition of the American National Standard Z223.1 National Fuel Gas Code. This publication covers installation, startup, and maintenance.

The Model 58DE Counterflow Gas-Fired Furnaces are shipped from the factory completely assembled and internally wired ready for indoor heating installation. The air conditioning models have a low-voltage terminal strip for convenience of field wiring.

The design of the 58DE Gas-Fired Furnaces is A.G.A. certified for installation on combustible flooring (with use of optional combustible floor base) in alcoves, closets, or utility rooms; with either natural or liquefied petroleum gas.

**CAUTION:** Do not install furnace in a room where combustion products may accumulate. Make sure that all local exhaust and combustion and circulating air supply are unobstructed.

### CLEARANCE REQUIREMENTS (in inches)

Sides.....	1
Back.....	0
Top.....	1
Vent Connector (single wall).....	6
Type B (double wall).....	1
Front.....	6
Provide service clearance of 30 in. at front of unit.	

### INSTALLATION

For installation on a combustible floor, see instructions packaged with the combustible floor base.

For installation on a noncombustible floor, place the furnace over opening in the floor. Make a seal between the furnace bottom and the floor to avoid excessive air leakage.

The furnace plenum opening in the floor should correspond with Figure 5 and Table III.

Installation comprises the following:

- \*I. Inspection
- \*II. Location, Ventilation, and Air for Combustion
- \*III. Gas Piping
- \*IV. Venting
- V. Electrical
- VI. Sequence of Operation
- VII. Filter Arrangement
- VIII. Startup and Adjustment
- IX. Care and Maintenance

\*To perform these sections (or installation steps), refer to the appropriate sections of "Procedures for Gas-Fired Furnaces" booklet packaged with this unit.

For accessory installation details, refer to applicable installation literature.



Figure 1 — Model 58DE080

### V. ELECTRICAL CONNECTIONS

#### A. Line-Voltage Wiring

**IMPORTANT:** Before proceeding with the electrical connections, make certain that voltage, frequency, and phase correspond to that specified on the unit rating plate. Also, check to be sure that the service provided by the utility is sufficient to handle the additional load imposed by this equipment. Refer to the unit rating plate for equipment electrical requirements.

**CAUTION:** Electrical wires to the furnace must be connected to the left side of the blower compartment using the holes provided and strain relief plugs or electrical conduit. Do not enlarge present electrical connection holes or cut additional holes in the blower compartment when the Heyco strain relief plugs are used. When electrical conduit connections are used, it may be necessary to enlarge the holes.

Use a separate branch electrical circuit for this furnace. A disconnecting means must be located within sight of, and within 50 feet of, the furnace.

**WARNING:** The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. This may consist of electrical wire or approved conduit when installed in accordance with existing electrical codes.

#### B. Low-Voltage Wiring

See Figure 3 for wiring diagram showing the proper field low-voltage wiring. Make all electrical connections in accordance with the National Electrical Code and any local codes or ordinances that might apply.

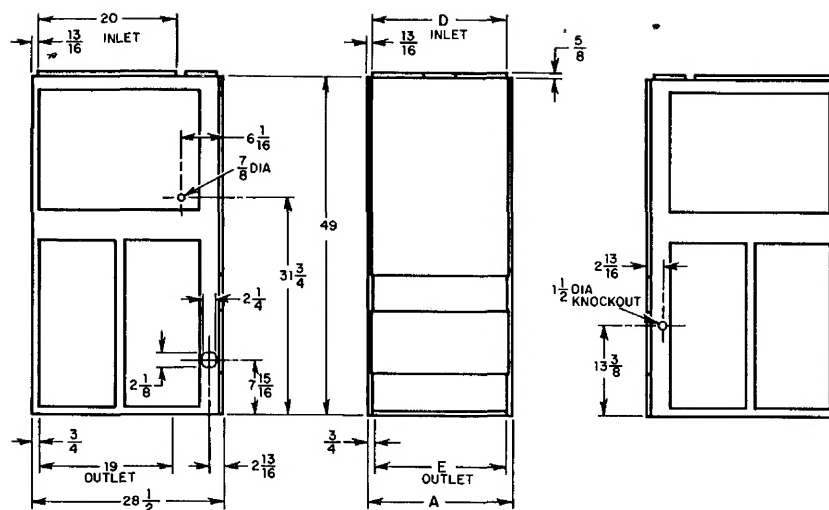


Figure 2—Dimensional Drawing

TABLE I—DIMENSIONS IN INCHES

SIZE 58DE	A	D	E	VENT SIZE	SHIP WT
050-200	14 1/8	12 1/2	12 5/8	4	131
080-100	17 1/2	15 3/4	16	4	138
080-200	17 1/2	15 3/4	16	4	143
100-100	17 1/2	15 3/4	16	5	165
100-200	17 1/2	15 3/4	16	5	170
125-100	21	19 3/4	19 1/8	5	207
125-200	21	19 3/4	19 1/8	5	212
150-200	24 7/16	22 3/4	23	6	240

Make field low-voltage connections at the low-voltage terminal strip on units equipped with a cooling relay. On heating-only units, two flagged wires are provided for making the thermostat connections. See Figure 4.

Set the thermostat heat anticipator at 0.9. If additional controls are connected in the thermostat circuit, their amp draw must be added to this setting. Failure to make the setting will result in improper operation of the thermostat.

The room thermostat should be located where it will be in the natural circulating path of room air. Avoid locations where the thermostat would be exposed to cold air infiltration, drafts from windows, doors, or other openings leading to the outside, or exposure to air currents from warm or cold air registers; or to exposure where the natural circulation of the air is cut off—such as behind doors, above or below mantels, shelves, etc.

The thermostat should not be exposed to heat from nearby fireplaces, radios, televisions, lamps, or rays from the sun.

Nor should the thermostat be mounted on a wall containing pipes or warm air ducts, or a flue or vent that could affect its operation and prevent it from properly controlling the room temperature. Any hole in the plaster or panel through which

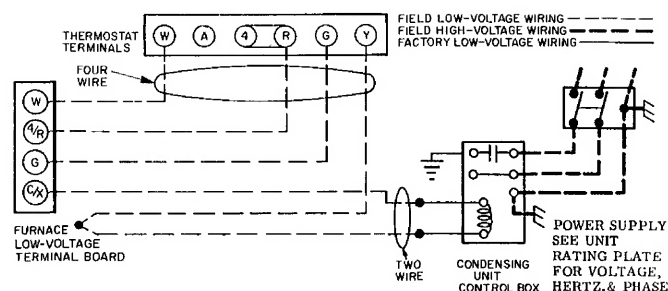
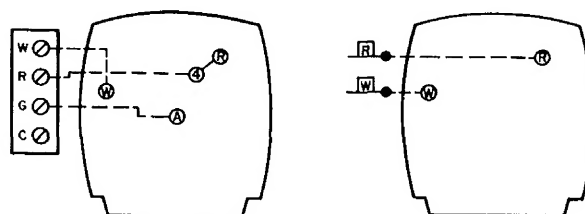


Figure 3—Heating and Cooling Application Wiring Diagram

**NOTE:** If any of the original wire, as supplied, must be replaced, use same type or equivalent wire



UNITS WITH COOLING RELAY HEATING ONLY UNITS

Figure 4—Thermostat Connections

TABLE II—RATINGS AND PERFORMANCE\*

SIZE 58DE	NATURAL AND LP		TEMP RISE RANGE	HEATING		COOLING	
	Input Btuh	Output Btuh		Ext Static Pressure	CFM	Ext Static Pressure	CFM
050-200	50,000	40,000	45- 75	—	617	0.5	800
080-100	80,000	64,000	70-100	0.12	700	—	—
080-200	—	—	45-100	—	855	0.5	1200
100-100	100,000	80,000	70-100	0.15	870	—	—
100-200	—	—	45-100	—	910	0.5	1400
125-100	125,000	100,000	70-100	0.20	1100	—	—
125-200	—	—	45-100	—	1206	0.5	1600
150-200	150,000	120,000	45- 75	0.20	1736	0.5	1920

\*The above ratings are approved for altitudes to 2000 ft. For elevations above 2000 ft, reduce ratings 4% for each 1000 ft above sea level

the wires pass from the thermostat should be adequately sealed with suitable material to prevent drafts from affecting the thermostat.

## VI. SEQUENCE OF OPERATION

### A. Heating (See Figure 8)

When the thermostat calls for heat, power from the transformer simultaneously energizes the pilot gas valve (inside of main gas valve), spark igniter, and heat-assist coil in the fan switch.

When the pilot flame is established, the flame sensing probe acts to energize the main gas valve, permitting gas flow to the burners. The electrode will continue to spark for approximately 5 to 10 seconds after pilot flame is established. The blower motor will be energized through the fan switch by means of the heat assist and temperature rise in the heat exchanger.

When the thermostat is satisfied, the circuit between R and W is broken, deenergizing the pilot gas valve, and stopping gas flow to both pilot and main burners. The main gas valve also closes. When the fan switch opens its contacts, the blower motor stops.

If the furnace overheats for any reason, the limit switch opens, breaking the circuit to the pilot valve coil, closing the pilot valve, and stopping gas flow to pilot and main burners. The pilot and main burners continue to cycle until the fault is corrected.

If there is a motor failure, clogged filters, blocked outlets, etc, heat will build up in the blower compartment. The auxiliary limit senses heat in the blower compartment and its contacts open, breaking the circuit to the low-voltage controls. The auxiliary limit is a manual reset and will require resetting before power can be restored to the low-voltage controls.

### B. Automatic Gas Control Valve

When the thermostat "calls for heat," the pilot valve opens, permitting gas flow to the pilot. When a pilot flame is established, the sensing probe permits energizing of the automatic

main gas valve. Gas then flows to the main burners where it is ignited by the pilot flame.

To shut off the gas manually: Turn knob from ON to OFF position. When in OFF position, the main burners and the pilot flame are extinguished.

### C. Spark Ignition Pilot

Each furnace is equipped with a fully automatic spark-ignited pilot. When the thermostat "calls for heat," the igniter is energized, sending a high-voltage charge to the electrode located at the pilot. After a pilot flame is established, sparking will continue for 5 to 10 seconds, and the flame sensing probe permits the main gas valve to open.

### D. Fan/Limit Control Operation

At the moment the main gas valve opens, the time-delay mechanism of the control is energized. If, due to pilot outage, the control bimetal element does not sense a temperature change, the control will turn on the blower strictly by means of the time-delay feature. If for any reason the time delay is not energized, the control bimetal element will bring on the blower when it senses a temperature rise of 70 degrees Fahrenheit (standard differential) above the turnoff setting. During the blow-down period and after the thermostat is satisfied, the control will turn the blower off at the indicated setting sensed by the control bimetal element.

### E. Cooling

When the thermostat "calls for cooling," power from the transformer energizes the blower relay coil, closing its contacts, and energizing the blower motor on its cooling speed. It continues to operate until the thermostat is satisfied.

When the thermostat is satisfied, the circuit to terminal (G) is broken, deenergizing the blower relay coil which, in turn, opens its contacts, stopping the blower motor.

## VII. FILTER ARRANGEMENT

The two factory-supplied filters are shipped in the blower compartment. After the return air duct has been connected to the furnace, install the filters in a V-formation inside the return air plenum. See Figure 9.

## VIII. STARTUP AND ADJUSTMENT

In addition to the following information, refer to "Procedures for Gas Furnace Installation" packaged with the unit.

Check heat exchanger tube mounting screws. Be sure all are in place and tight.

### A. Adjustment of Blower Speed

**NOTE:** Some units have a shipping bracket supporting the shaft end of the motor. This bracket should be removed and discarded.

**Heating Models**—To change speed, unplug black wire terminal connector and reinsert at desired speed.

**Air Conditioning Models**—To change cooling speed, unplug black wire terminal connector and reinsert for desired speed. For heating speed, unplug red terminal connector and reinsert for desired speed.

### B. Automatic Gas Control Valve

The automatic gas valve controls the flow of gas to both pilot and main burners. The manual valve is built into the automatic gas valve body. The manual valve has only two positions: OFF and ON. It does not have an intermediate position for pilot gas flow only.

If not already checked when lighting the main burner, check the proper operation of this valve by moving the room thermostat pointer above and below room temperature and observing that the main burners light on "call for heat" and go off when the pointer is moved below the room temperature setting.

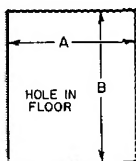


Figure 5—Floor Opening

TABLE III—FLOOR OPENING DIMENSIONS

MODEL 58DE SIZE	A
050	13
080, 100	16½
125	20
150	23½

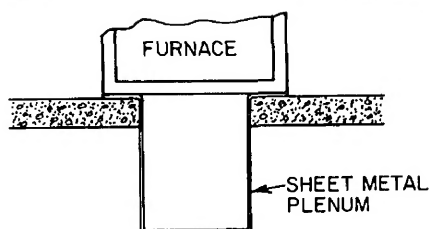


Figure 6—Furnace on a Concrete Slab

## LINE-TO-LINE WIRING DIAGRAMS

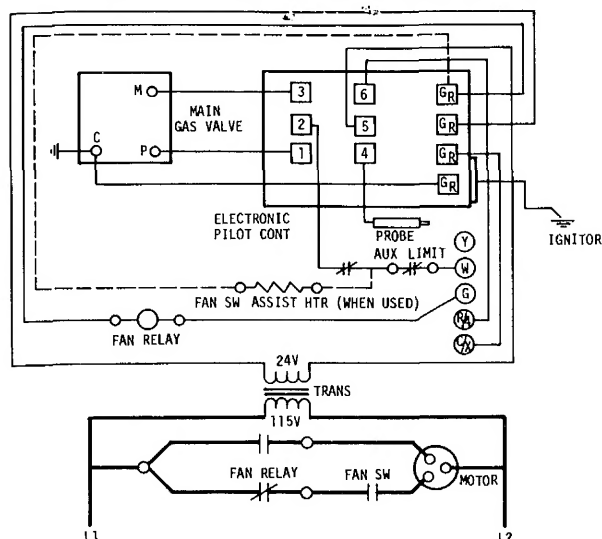


Figure 7—Units Equipped for Cooling

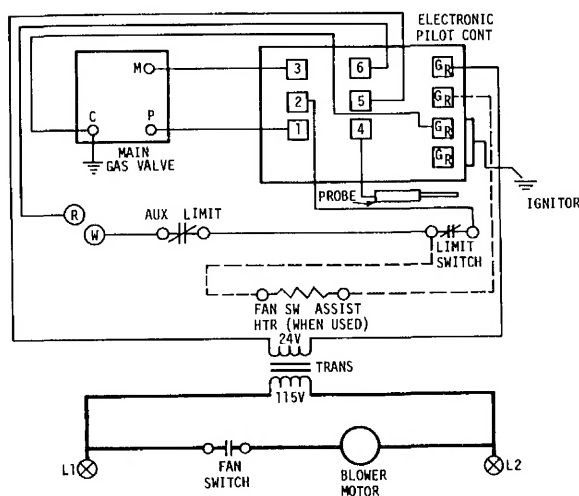


Figure 8—Heating-Only Units

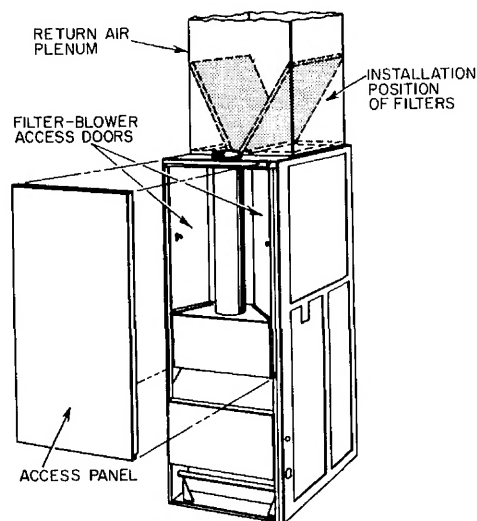


Figure 9—Position of Filters

## TABLE IV—SPEED SELECTOR

Wire/Speed	Tap No.
White/Common	C
Black/Hi	1
Blue/Med-Hi	2
Yellow/Med-Lo	3
Red/Lo	4

## IX. CARE AND MAINTENANCE

**WARNING:** Never store anything on, or in contact with, the furnace, such as:

1. Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners, or other cleaning tools.
2. Soap powders, bleaches, waxes or other cleaning compounds, plastic or plastic containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.
3. Paint thinners and other painting compounds, paper bags or other paper products.

For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult your local Dealer as to the proper frequency of maintenance and the availability of a maintenance contract.

The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these, contact your Dealer for maintenance.

**WARNING:** Turn off gas and electrical supply to unit before performing any maintenance or service on unit.

The minimum maintenance that should be performed on this equipment is as follows:

1. Check and clean or replace air filter each month or as required.
2. Check blower motor and wheel for cleanliness and lubrication each heating and cooling season. Clean and lubricate as necessary.
3. Check electrical connections for tightness and controls for proper operation each heating season. Service as necessary.

**WARNING:** As with any mechanical equipment, personal injury can result from sharp metal edges, etc.; therefore, be careful when removing parts.

### A. Air Filters

Each furnace accommodates two filters which are installed above the furnace in the return air plenum. See Figure 9.

To clean or replace the filters, proceed as follows:

1. Remember to disconnect electric power before removing access panels.
2. Remove front access panel.
3. Remove filter/blower access doors located beside flue pipe. See Figure 9.
4. Remove filters from return air plenum. Replace or clean as needed.
5. Some furnaces are equipped with permanent washable filters.
  - a. Clean with tap water.
  - b. Rinse and let dry.
  - c. No oiling or coating of filter is required.
  - d. Reinstall filters with cross-sectional binding facing blower.

**CAUTION:** Never operate unit without filters or with access panels removed. Damage to blower motor may result.

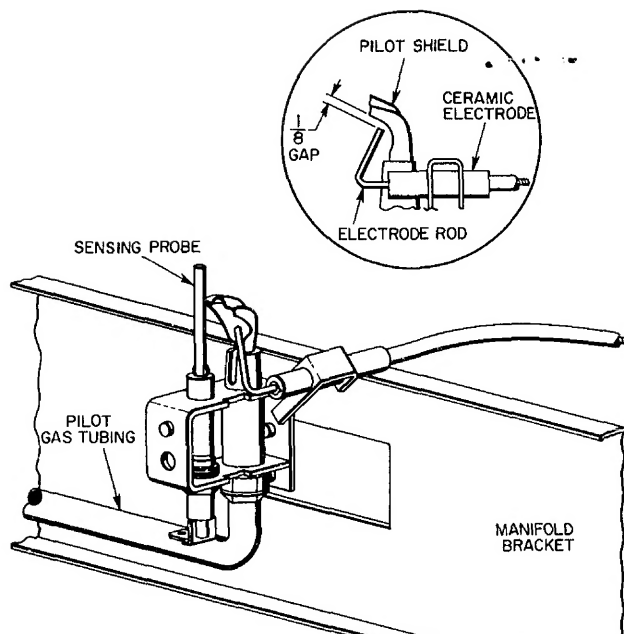


Figure 11—Position of Electrode to Pilot Shield

TABLE V—TROUBLE ANALYSIS CHART

**WARNING: Turn off gas and power supply to unit before servicing (unless specific test requires gas and electric supplies).**

SYMPTOM	CAUSE	REMEDY
Pilot will not light	No spark at electrode	Readjust, if necessary, so that gap between electrode tip and pilot burner is $1/8 - 0.005$ inch + 0.025
		Clean dirt or moisture accumulation from electrode ceramic with cloth.
		Cracked ceramic—replace pilot electrode assy.
		Check for loose or broken wiring at and between spark generator and electrode. Replace wire or tighten connection as necessary.
		Check fuse or circuit breaker for 115-volt supply to furnace.
		Check 24-volt input to spark generator. If you read 24 volts and above steps have been completed, replace spark generator assy.
	Spark shorting out to main burner	Readjust electrode as specified.
	No gas at pilot burner	Clean pilot orifice.
		Check for proper opening of pilot valve, broken wires, or loose connections. If no deficiency is found, replace valve assy.
Burners will not ignite.	No 115-volt power to furnace	Connect to power supply. Check fuse, wiring, or circuit breaker.
	No 24-volt power to control circuit	Replace transformer.
	Miswired or loose connections	Check all wiring and all wirenut connections.
	No gas at main burners	Check voltage to terminals 1 and 2 of gas valve.
		Check for proper opening of main gas valve, broken wires, or loose connections. If no deficiency is found, replace gas valve assy.
	Flame probe or connecting lead is shorted or open.	Correct electrical shorting or open circuit
Inadequate heating	Dirty pilot—yellow flame	Clean pilot orifice.
	Manual reset limit switch contacts open	Faulty fan switch—replace. Combination of incorrect fan switch setting and dirty filters—reset fan switch and clean or replace filters.
	Furnace undersized for application	Replace with proper size furnace.
	Gas input to furnace too low	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or install correct orifices.
		Clean dirty air filters—reinstall.
		Increase blower speed.
	Limit switch cycles main burners	Lower OFF setting of fan control.
		Open registers—ductwork restricted.
		Check anticipator setting on thermostat.
		Adjust air shutter on burners to provide soft, blue flame. Check all screws around flue outlets and burner compartment. Tighten.
Aldehyde odors, (CO), sooting flame—floating flame	Incomplete combustion—poor flame characteristics	See "Section II, Location & Air for Combustion & Ventilation" (Std Procedures for Gas-Fired Furnaces).
		Replace cracked heat exchanger.
		Reduce input and check orifices—furnace overfired.
		Check vent for restriction.

For replacement items use Carrier Specified Parts.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Tab 10

Form 58DE-1SI New

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Catalog No 535-831

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